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UPPER DECIDUOUS DENTITION OF THE OLIGOCENE INSECTIVORE *LEPTICTIS (=ICTOPS) ACUTIDENS*

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INTRODUCTION

A partial leptictid insectivore maxilla with two deciduous premolars in place was collected by the 1939 Carnegie Museum field party at the early Oligocene Pipestone Springs fossil locality in southwestern Montana. This specimen, CM 9580, assigned to *Leptictis acutidens,* retains the left dP^3, dP^4, and erupting M^2. It permits description of part of the milk dentition of *Leptictis acutidens,* comparison with part of the deciduous dentition of better known *L. haydeni,* and reconstruction of a likely *Leptictis* eruption sequence.

Leptictis acutidens, one of a group of smaller species at present placed in *Leptictis,* was initially described by Douglass in 1902 as *Ictops acutidens,* and was more completely discussed and illustrated by Matthew (1903: 205-207). Van Valen has recently (1967: 235) determined *Ictops* to be a senior synonym of *Leptictis.* He retained the generic name *Leptictis* in order to maintain consistent use of the family name Leptictidae, although this is not required by the International Code of Zoological Nomenclature.

Leptictid deciduous teeth have recently been discussed by several authors. Donald Russell (1964: 47-51, pl. III) described and illustrated dP^4 of the (French Paleocene) questionable leptictid *Adunator lehmani.* Lillegraven (1969: 52-57, figs. 27-28) compared presumed deciduous teeth of Cretaceous *Gypsonictops illuminatus* with those of the Oligocene *Leptictis haydeni.* Clemens (in press) compares *Cimolestes incisus*

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from the Late Cretaceous with the same specimen of *Leptictis haydeni* that Lillegraven used. Although Lillegraven illustrated *L. haydeni,* his discussion concentrated on the Cretaceous leptictids and much description of *Leptictis* was thus omitted.

ABBREVIATIONS

CM—Carnegie Museum, Section of Vertebrate Fossils.

F:AM—Frick collection of American fossil mammals, Department of Vertebrate Paleontology, the American Museum of Natural History.

NMNH—National Museum of Natural History, Smithsonian Institution, Department of Vertebrate Paleontology.

DP^3 AND DP^4 OF *Leptictis acutidens* AND COMPARISON WITH *L. haydeni*

A series of six specimens of *Leptictis haydeni,* each retaining part of the deciduous dentition, has been assembled. These are listed below, and measurements of all their teeth except those of NMNH 16501 are given in Table 1. Only the upper deciduous teeth are described here, as the lower deciduous teeth of *Leptictis acutidens* are not yet known. The lower deciduous teeth of the specimens of *L. haydeni* listed below are similar to those of F:AM 74963, illustrated by Lillegraven (1969).

F:AM 74963—Middle Oligocene, Converse Co., Wyoming.

NMNH 16501—White River Group, Slope Co., North Dakota.

NMNH 167651—Brule Formation, White River Group, Niobrara Co., Wyoming.

NMNH 167652—Brule Formation, White River Group, Niobrara Co., Wyoming.

NMNH 167653—White River Group, Sioux Co., Nebraska.

NMNH 167654—Brule Formation, White River Group, Niobrara Co., Wyoming.

As shown in Table 1, *L. acutidens* is considerably smaller than *L. haydeni,* and some of the differences between the teeth of the two species are allometric, while the more delicate *L. acutidens* differs from *L. haydeni* in several basic morphologic features, as detailed below.

DP^3 of CM 9580 is notable for the large parastyle, actually a separate anterior lobe which significantly extends the labial side of the tooth (Fig. 1). This cusp is more pronounced in *L. acutidens* than in *L. haydeni* (Figs. 2 & 3). The paracone is much larger than the metacone. Both are in a direct line with the parastyle along the labial side of the tooth. The *L. haydeni* metacone is better developed than that of *L. acutidens.* In the latter, the metastyle, a low ridge somewhat longer than in *L. haydeni,* continues the alignment. The protocone is low and lingual to the notch between the paracone and metacone. A low crest extends from the protocone, toward, but without meeting, the metacone

TABLE 1

MEASUREMENTS IN MM., DECIDUOUS TEETH OF *Leptictis*

		L. acutidens	*L. haydeni*								
		CM 9580	F:AM 74963		NMNH 167651		NMNH 167652		NMNH 167653		NMNH 167654	
dP^2		Left	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
	L										3.5	3.4
	W										1.2	1.0
dP^3	L	3.4		4.1	4.9	4.7	4.3	4.2		4.3	4.6	4.6
	W	1.3		3.2	3.2	3.6	2.9	2.9		3.0	3.1	—
dP^4	L	3.0		4.1			4.0	3.7	3.8	4.0	3.8	3.8
	W	2.8		4.2			3.9	3.8	—	4.0	3.9	—
dP_2	L											2.8
	W											1.0
dP_3	L		3.6		4.7	4.6			3.8	4.0		4.3
	W		1.4		1.8	1.9			2.0	—		—
dP_4	L		4.8		4.7	4.6	4.6	4.6	4.5	4.3	4.9	4.8
	Wtr		2.1		2.2	2.3	2.0	2.0	2.8	—	2.2	—
	Wta		2.1		2.5	2.5	2.1	2.2	2.7	—	2.3	—

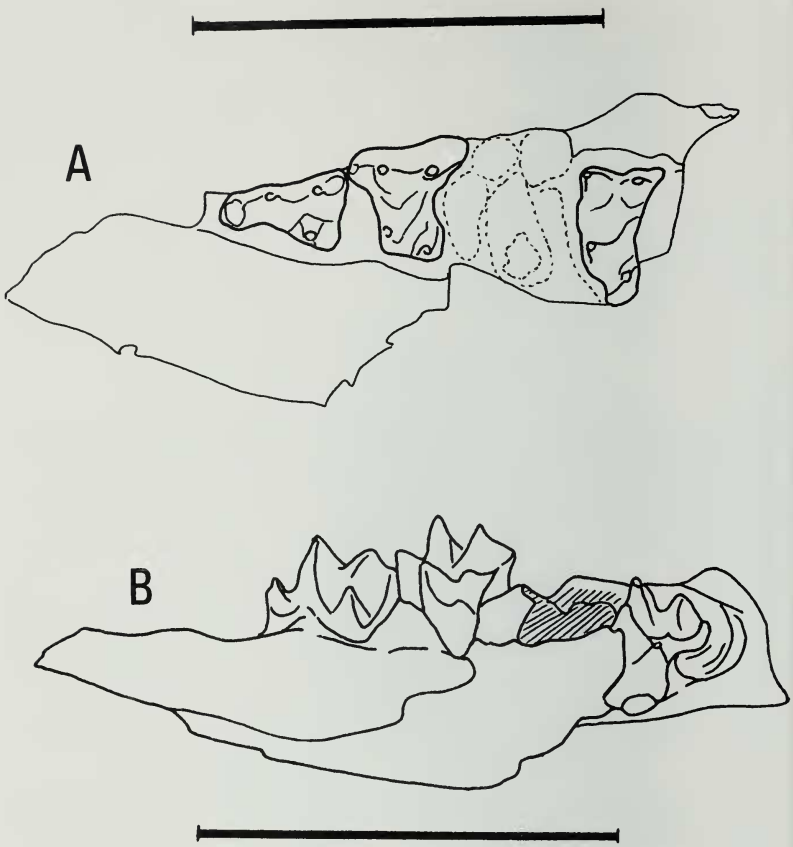


Fig. 1. *Leptictis acutidens* maxilla, CM 9580. A. Occlusal view. B. Lingual view. Scale indicates 10 mm.

Conules are absent from the dP^3 of *L. acutidens,* but there is a well-developed, isolated paraconule on dP^3 of *L. haydeni.*

A weak cingulum bounds the labial face of the metastyle and metacone, whereas the *L. haydeni* dP^3 has a strong cingulum extending along the entire labial side of the tooth. *L. haydeni* has a small postero-internal platform, not present in dP^3 of *L. acutidens.* As shown in Table 1, dP^3 of *L. acutidens* is relatively narrower than that of *L. haydeni.* The dP^3 length/width ratio of *L. acutidens* is 1: 2.6; that of *L. haydeni* is 1: 1.6. Much of this difference is due to the smaller protocone and absence of conules in *L. acutidens.*

DP^4 in both species is larger and more molariform than dP^3, and is proportionally wider than the molars. The large parastyle is elongate

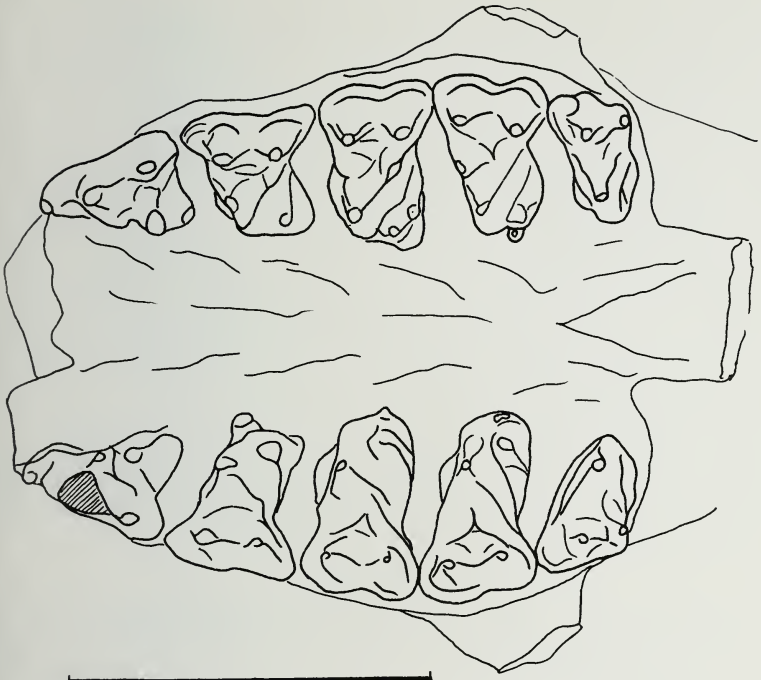


Fig. 2. *Leptictis haydeni* maxilla, NMNH 167652, occlusal view of upper dentition with dP^3 and dP^4. Scale indicates 10 mm.

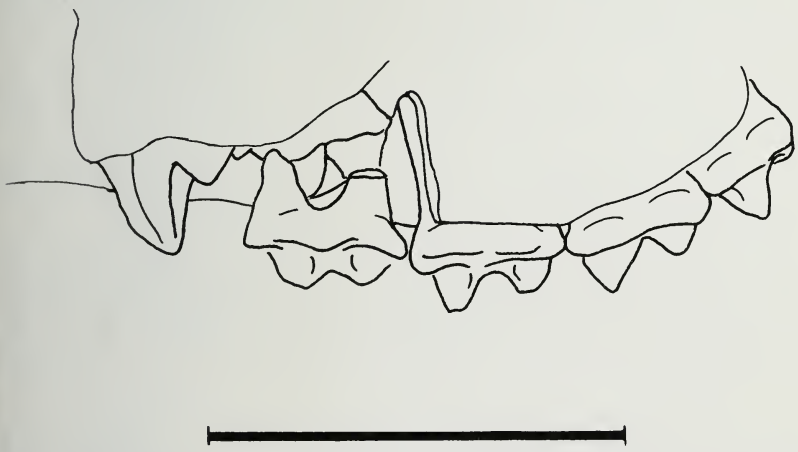


Fig. 3. *Leptictis haydeni* maxilla, NMNH 167653, labial view of left side showing P^3 and P^4 in place beneath dP^4. A tiny piece of dP^3 remained in the matrix prior to cleaning, and is not shown in the drawing. Scale indicates 10 mm.

linguo-bucally, with a small labial crest in *L. acutidens.* The parastyle does not form a discrete cusp as one dP^3. The paracone of dP^4 in *L. acutidens* is as high as that of dP^3; in *L. haydeni* it is considerably lower. In both species, the dP^4 paracone is joined by a sharp crest to the well-developed, although lower metacone, which is relatively smaller in *L. haydeni.* The unworn protocone of dP^4 of *L. acutidens* is about one-half the height of the labial cones and is located lingual to the protocone. Both species have two conules on dP^4. A deep trigon basin lies in the center of these five cusps. *L. acutidens* has no external cingulum, whereas individuals of *L. haydeni* generally have well-developed external cingula on dP^4. In *L. acutidens,* a broad shelf on the flank of the tooth external to the metacone may be the precursor of a partial labial cingulum. This shelf is not developed in *L. haydeni.* The hypocone is better developed in *L. acutidens,* where it is a definite cusp on the low posterior-internal shelf. The shelf is present in *L. haydeni,* but the hypocone itself is not so discrete. However, an anterior-internal low shelf is present on dP^4 of *L. haydeni,* whereas the anterior part of the *L. acutidens* dP^4 has a smooth face with no indication of cingulum development.

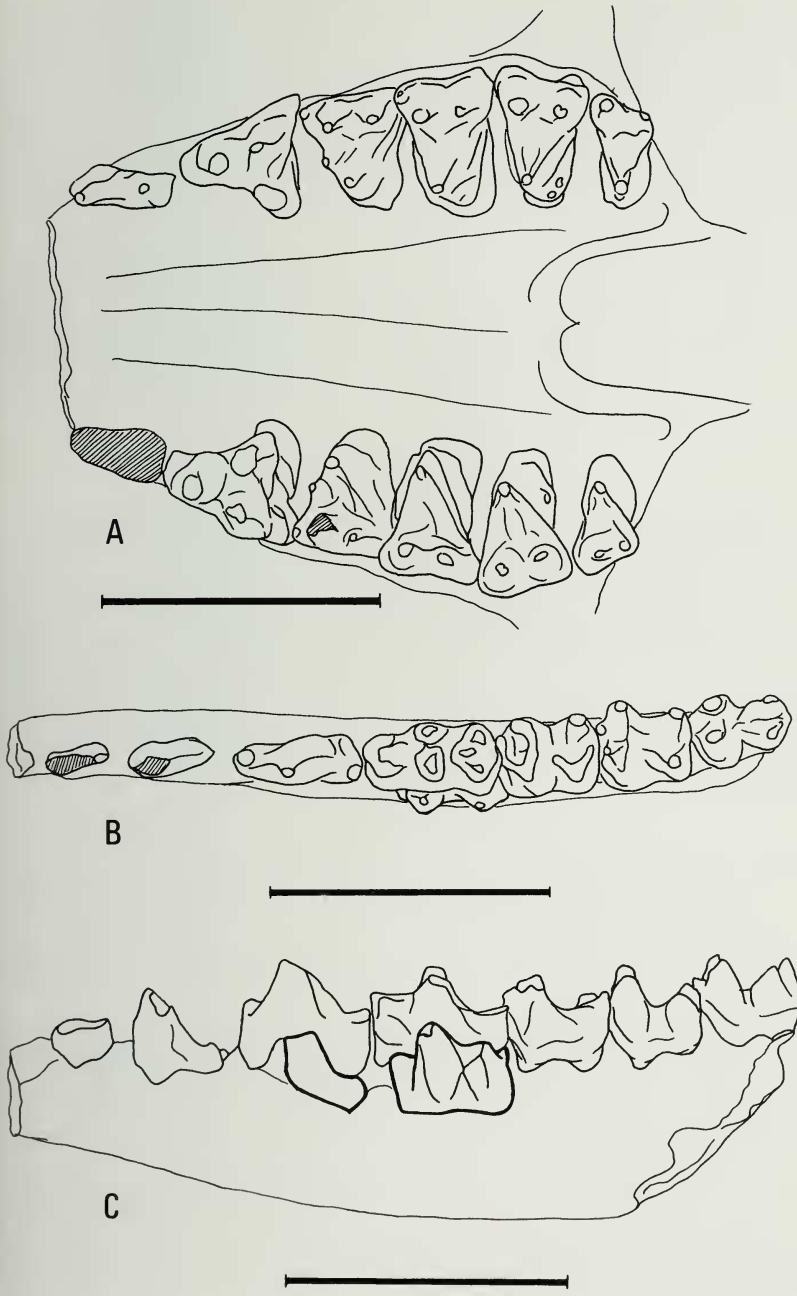
ERUPTION SEQUENCES

Leptictis acutidens: CM 9580 permits speculation only on the final part of the eruption sequence. The permanent first and second molars preceded the appearance of the permanent premolars. The second premolar apparently was in a pre-eruption stage while M^2 was emerging. It cannot be determined from this single specimen whether M^3 emerged before, after, or simultaneously with, P^3 and P^4. Another specimen tentatively assigned to *L. acutidens* (F:AM 74955) shows both P^3 and P^4 in the pre-emergent condition while M^3 is in place and slightly worn. Thus a possible sequence is $dP^{(2,3,4)}$, M^1, M^2, M^3, $P^{(2,3,4)}$, with details within the deciduous and permanent premolar series unavailable.

The wear on the milk premolars of CM 9580 is minimal. This suggests that the permanent molars erupted relatively early in the animal's life, before there could be much wear on the deciduous teeth.

Leptictis haydeni: The six specimens of this species listed above allow a more complete interpretation of the eruption sequence than for *L. acutidens.* The entire molar series is emplaced prior to loss of dP^3 and dP^4, as can be seen on NMNH 167652 (Fig. 2). P_2 is in place in

Fig. 4. *Leptictis haydeni,* NMNH 167651. A. Maxilla, occlusal view showing functional P^4 and remaining dP^3. P^3 is partly visible on the right side. B. Occlusal view of left mandible with both dP_3 and dP_4 in place. P_4 may be seen erupting beneath dP_4. C. Labial view of left mandible with P_3 and P_4 seen erupting beneath dP_3 and dP_4. Scale indicates 10 mm.


A
B
C

NMNH 167653, while both dP_3 and dP_4 are functioning. Presumably the same situation obtained in the upper dentition where the area of the second premolar is missing. P^3 and P^4 became functional almost simultaneously, with dP^4 lost before dP^3 (NMNH 167651, fig. 4).

Thus, the upper eruption sequence is probably $dP^{(2,3,4)}$, M^1, M^2, M^3, P^2, P^4, P^3. Available specimens do not permit suggestions as to the sequence of deciduous teeth eruption, nor as to the presence of a deciduous precursor to the first premolar.

Various specimens of *L. haydeni* show the relatively unworn state of the deciduous teeth at the time of molar emergence, as well as the considerable wear on milk teeth prior to their loss. Granting that the enamel of deciduous teeth shows wear more rapidly than that of permanent teeth, it is still apparent that *Leptictis* maintained a functional row of premolariform dP^3, molariform dP^4 and three true molars for a fairly substantial part of its lifespan.

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